



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/734,152	12/15/2003	Kenneth Richard Astley	114673	2080
25944	7590	06/23/2005	EXAMINER	
OLIFF & BERRIDGE, PLC P.O. BOX 19928 ALEXANDRIA, VA 22320			LE, JOHN H	
			ART UNIT	PAPER NUMBER
			2863	

DATE MAILED: 06/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/734,152

Applicant(s)

ASTLEY ET AL.

Examiner

John H. Le

Art Unit

2863

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 May 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 4-11 and 14 is/are allowed.
- 6) ☒ Claim(s) 1-3, 12 and 13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

Response to Amendment

1. This office action is in response to applicant's amendment received on 05/03/2005.

Claims 1, 8, and 13 have been amended.

The abstract has been amended.

The Drawings have been amended.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Yoshioka et al. (USP 5,811,683).

Regarding claim 1, Yoshioka et al. disclose a method for locating bearing anomalies in machinery (Fig.1), comprises: receiving vibration measurements acquired from the machinery (Fig.1, vibration acceleration sensors 7, 8, and 11, Col.3, lines 12-33), analyzing the vibration measurements to identify novel tracked orders indicative of bearing anomalies, and ascertaining the location of a bearing anomaly (e.g. e.g. Col.6, lines 41-64, Col.7, lines14-25) by relating a novel tracked order thus-identified to one or more further tracked orders (e.g. Col.4, lines 7-9, lines 62-65, Col.5, lines 10-12, Col.6, lines 58-64, Figs.8-9, Col.5, lines 29-45).

Regarding claim 2, Yoshioka et al. disclose tracked orders comprise at least one side band to the novel tracked order (e.g. Figs. 12A-12B, Col.41-64).

Regarding claim 3, Yoshioka et al. disclose tracked orders comprise a tracked order associated with a component supported by the anomalous bearing (e.g. 14-29).

Regarding claim 13, Yoshioka et al. disclose a data processing system (Fig.10) for locating bearing anomalies in machinery (e.g. Col.5, lines 57-65), comprising; a data receiver (29) for receiving vibration measurements acquired from the machinery, a processor (30)(e.g. Col.4, lines 1-2) for analyzing the vibration measurements to identify novel tracked orders indicative of: bearing anomalies, and ascertaining the location of a bearing anomaly (e.g. Col.6, lines 41-64, Col.7, lines14-25) by relating a novel tracked order thus-identified to one or more further tracked orders (e.g. Col.4, lines 7-9, lines 62-65, Col.5, lines 10-12, Col.6, lines 58-64, Figs.8-9, Col.5, lines 29-45)

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshioka et al. (USP 5,811,683) in view of Bently (USP 6,092,029).

Regarding claim 12, Yoshioka et al. fail to disclose the machinery comprises a gas turbine engine.

Bently teaches the machinery comprises a gas turbine engine (Fig.7).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the machinery comprises a gas turbine engine as taught by Bently in a method for detecting bearing anomalies in machinery of Yoshioka et al. for the purpose of providing a new, novel and useful method and apparatus for diagnosing and correcting rotating stall and surge effects in rotating machinery (Bently, Col.3, lines 11-14).

Allowable Subject Matter

6. Claims 4-11 and 14 allowed.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 4, none of the prior art of record teaches or suggests the combination of a method for detecting bearing anomalies in machinery, wherein the method comprises performing at each of a plurality of times the steps of: constructing a condition signature from a plurality of condition indicators including (a) a plurality of vibration measurements acquired from the machinery or (b) one or more vibration measurements and one or more performance parameter measurements acquired from the machinery; predicting a normal signature corresponding to the condition signature for the machinery without bearing anomalies; comparing the condition signature with the normal signature; and registering a bearing anomaly if the condition signature differs from the normal signature by more than a predetermined threshold. It is these limitations as they are claimed in the combination with other limitations of claim, which

have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 14, none of the prior art of record teaches or suggests the combination of a data processing system for detecting bearing anomalies in machinery, comprising: data acquisition devices for acquiring a plurality of condition indicators from the machinery at each of a plurality of times, the condition indicators including (a) a plurality of vibration measurements or (b) one or more vibration measurements and one or more performance parameter measurements; a processor for constructing a condition signature from said vibration measurements and for predicting a normal signature corresponding to the condition signature for the machinery without bearing anomalies; a comparator for comparing the condition signature with the normal signature; and a register for registering a bearing anomaly if the comparator indicates that the condition signature differs from the normal signature by more than a predetermined threshold. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Response to Arguments

7. Applicant's arguments filed 05/03/2005 have been fully considered but they are not persuasive.

-Applicant argues that the prior did not teach "a method for locating bearing anomalies in machinery, comprises: receiving vibration measurements acquired from the machinery, analyzing the vibration measurements to identify novel tracked orders

indicative of bearing anomalies, and ascertaining the location of a bearing anomaly by relating a novel tracked order thus-identified to one or more further tracked orders” as cited in claim 1.

Examiner position is that Yoshioka et al. teach a method for locating bearing anomalies in machinery (Fig.1), comprises: receiving vibration measurements acquired from the machinery (Fig.1, vibration acceleration sensors 7, 8, and 11, Col.3, lines 12-33), analyzing the vibration measurements to identify novel tracked orders indicative of: bearing anomalies, and ascertaining the location of a bearing anomaly (e.g. Col.7, lines14-25) by relating a novel tracked order thus-identified to one or more further tracked orders (e.g. Col.4, lines 7-9, lines 62-65, Col.5, lines 10-12, Col.6, lines 58-64, Figs.8-9, Col.5, lines 29-45).

-Applicant argues that the prior did not teach, “tracked order is a specific vibration response which is associated with a respective machine component. Tracked orders can be illustrated by plotting the frequency of the particular response against engine speed or time”.

Examiner position is that “tracked order is a specific vibration response which is associated with a respective machine component. Tracked orders can be illustrated by plotting the frequency of the particular response against engine speed or time” was not described in the cited claims 1-14.

-Applicant argues that the prior did not teach “a data processing system for locating bearing anomalies in machinery, comprising; a data receiver for receiving vibration measurements acquired from the machinery, and a processor for (a) analyzing

Art Unit: 2863

the vibration measurements to identify novel tracked orders indicative of bearing anomalies, and (b) ascertaining the location of a bearing anomaly by relating a novel tracked order thus-identified to one or more further tracked orders” as cited in claim 13.

Examiner position is that Yoshioka et al. teach a data processing system (Fig.10) for locating bearing anomalies in machinery (e.g. Col.5, lines 57-65), comprising; a data receiver (29) for receiving vibration measurements acquired from the machinery, a processor (30)(e.g. Col.4, lines 1-2) for analyzing the vibration measurements to identify novel tracked orders indicative of: bearing anomalies, and ascertaining the location of a bearing anomaly (e.g. Col.6, lines 41-64, Col.7, lines14-25) by relating a novel tracked order thus-identified to one or more further tracked orders (e.g. Col.4, lines 7-9, lines 62-65, Col.5, lines 10-12, Col.6, lines 58-64, Figs.8-9, Col.5, lines 29-45).

-Applicant argues that the prior did not teach, “a method for detecting bearing anomalies in machinery, which comprises performing at each of a plurality of times the steps of: constructing a condition signature from a plurality of condition indicators including (a) a plurality of vibration measurements acquired from the machinery or (b) one or more vibration measurements and one or more performance parameter measurements acquired from the machinery; predicting a normal signature corresponding to the condition signature for the machinery without bearing anomalies; comparing the condition signature with the normal signature; and registering a bearing anomaly if the condition signature differs from the normal signature by more than a predetermined threshold.” as cited in claim 4.

Examiner agrees, therefore claims 4-11 are allowed.

-Applicant argues that the prior did not teach, "a data processing system for detecting bearing anomalies in machinery, comprising: data acquisition devices for acquiring a plurality of condition indicators from the machinery at each of a plurality of times, the condition indicators including (a) a plurality of vibration measurements or (b) one or more vibration measurements and one or more performance parameter measurements; a processor for constructing a condition signature from said vibration measurements and for predicting a normal signature corresponding to the condition signature for the machinery without bearing anomalies; a comparator for comparing the condition signature with the normal signature; and a register for registering a bearing anomaly if the comparator indicates that the condition signature differs from the normal signature by more than a predetermined threshold." as cited in claim 14.

Examiner agrees, therefore claim 14 is allowed.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

Art Unit: 2863

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John H Le whose telephone number is 571-272-2275. The examiner can normally be reached on 8:00 - 4:30.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E Barlow can be reached on 571-272-2269. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

John H. Le

Patent Examiner-Group 2863

June 16, 2005


MICHAEL NGHIEM
PRIMARY EXAMINER